INSTRUCTION MANUAL

OVERVOLTAGE PROTECTORS

LMOV-1, LMOV-2
AND LMOV-3,
LHOV-4, LHOV-5
AND LHOV-6
LMOV-7, LMOV-8
AND LMOV-9

LAMBDA

LAMBDA ELECTRONICS CORP.–MELVILLE, L. I., N. Y.

GENERAL INFORMATION

The Lambda overvoltage protector prevents damage to the load caused by excessive power supply output voltage due to improper adjustment, improper connection, or failure of the power supply. Load protection is accomplished automatically by effectively short circuiting the output terminals of the power supply when a preset limit voltage has been exceeded.

Although designed specifically for use with the Lambda LC, LH, LK, LM, LO, LP, LR, LS, LT, LX, and LY series power supplies listed below, the overvoltage protector can be used with other similarly rated current-limited power supplies when certain basic precautions are observed. When mounted on a 1/16 inch thick aluminum heat sink of at least 20 square inches, in an ambient temperature of up to 80°C, the unit can withstand a fault current of 35 amperes for a period of one minute, or of 80 amperes for a period of one second. Consult the factory for specific other-model application information.

The "S" option overvoltage protector is specifically designed to be used with Lambda System Power Sequencer and Protectors.

The overvoltage protector will not provide protection against overvoltage conditions caused by storage batteries or other power sources used in conjunction with the Lambda power supply. Whenever additional power sources must be used with the Lambda power supply and overvoltage protector combination, consult the factory for proper installation information.

The adjustable voltage range of each overvoltage protector for specific power supply output voltage ranges are listed below.

OV MODEL	ADJUSTABLE VOLTAGE RANGE	SUGGESTED P.S. OUTPUT VOLTAGE RANGE	LAMBDA POWER SUPPLY MODELS
LMOV-1, -7†	3 - 8 VDC	1.8-6.0 VDC	LCS-4, LCS-A thru LCS-EE, LCD-4 FIXED VOLTAGE SERIES; LMA thru LMEE FIXED VOLTAGE SERIES; LOS-R thru LOS-Z; LOD-W thru LOD-Z; LOT-R thru LOT-X; LTS-CA, -DB, -DC,-E,-EE; LTD-CA, - DB,-E; LTT-EE; LTQ-EE; LXS-4; LXS-A thru LXS-EE; LXD-A thru LXD-EE; LYS-5; LYD-5; LYT-5; LYQ-5
LMOV-2, -8†	6 - 20 VDC	4.2-16.0 VDC	
LMOV-3, -9†	18 - 70 VDC	15.0-60.0 VDC	
LHOV-4*	3 - 24 VDC	1.8-20.0 VDC	LCS-4, LCS-A thru LCS-EE, LCD-4, LCD-A WIDE RANGE SERIES; LH118A, 119A, 121 A&B, 122A; LK340A, 341A; LMA thru LMEE WIDE RANGE SERIES; LP-410, 410A, 411, 411A, 520, 521, 530, 531; LPD-421, 421A; LPT-7202; LR-602 FM, 602AFM, 612FM, 612AFM, 611DM, 612DM; LS-511, 512;
LHOV-5*	3 - 47 VDC	1.8-40.0 VDC	LCS-4, LCS-A thru LCS-EE, LCD-4, LCD-A WIDE RANGE SERIES; LH124A&B, 125A; LK-342A, 343A; LMA thru LMEE WIDE RANGE SERIES; LP-412, 412A, 522, 532; LPD-422, 422A; LR-603FM, 603AFM, 613FM, 613AFM, 613DM; LS-513;
LHOV-6*	3 - 70 VDC	1.8-60.0 VDC	LCS-4, LCS-A thru LCS-EE, LCD-4, LCD-A WIDE RANGE SERIES; LH127A, 128A; LK-344A, 345A; LMA thru LMEE WIDE RANGE SERIES; LP-413, 413A, 523, 533; LPD-423, 423A;

*THESE "OV" UNITS, WHEN USED WITH "LK AND LH" SERIES ARE USED ONLY ON "A" SUFFIX "LK, AND LH" "A&B" SUFFIX MODELS.
†ONLY USED ON LCS-EE, LM-EE, LXS-EE, LXD-EE.

THEORY OF OPERATION

Divider network R1, R2, R3, R4 and R7 attenuates the power supply output voltage. When the power supply increases above the overvoltage limit set by R1, the attenuated voltage of the divider network also increases, biasing transistor Q1 on. Q1 in turn biases Q2 on through resistor R10. Q2 supplies gate current to SCR-1, turning it on, causing an effective short circuit across the supply output terminals*. This in turn causes the voltage at the power supply terminals to drop, protecting the load from excessive supply output voltage. SCR-1 or, as applicable, SCR-2 conducts until the power supply is turned off, or until a fusible link in the circuit clears, causing power to be cut off.
*On LMOV-7, -8 and 9, SCR1 triggers SCR2 on via R12, causing an effective short circuit across the supply output terminals.

INSTALLATION AND ADJUSTMENT

Install the Overvoltage Protector as Follows:

1(a) Position the protector on the power supply, figure 1, 2, or 4 so that the unit is located adjacent to the supply output terminal block and the red and black leads are next to the terminal block.*

*For use on LO and LT series power supplies, see Outline Drawing in power supply instruction manual for mounting position of Overvoltage Protector.

(b) (Applicable only to "S" option units) Attach turret terminal to the barrier strip of power supply using hardware supplied with the overvoltage protector. Connect violet lead, from the protector, to turret terminal. See Figure 2.

2. Connect and solder red lead to the +V output terminal and the black lead to the -V output terminal of the power supply.**

**For use on LO series power supplies, Overvoltage Protector leads must be extended. Quick disconnect terminals HKA-01-023 are available to mate with OV terminals on LOS-W, X, Y, Z, LOD, and LOT-W, X series power supplies.

3. Align the two 6-32 captive screws located on the protector†, with the two existing pre-tapped 6-32 holes in the power supply†† and firmly tighten screws to secure the protector in position. See figure 3.
† Four holes for #6-32 screws are provided on each unit of LMOV 7, 8, and 9; captive screws are not provided.

†† LO and LT series power supplies leave #6 clearance holes. Use a #6-32 nut to fasten Overvoltage Protector to power supply.

Adjust the Overvoltage Protector Voltage-Protection Point as Follows:

1. Turn voltage adjust control on overvoltage unit fully clockwise.

2. The recommended voltage-protection point is 115% of normal power supply operating voltage plus one volt. Compute this value for the operating voltage being used.

3. Turn on the power supply, and raise the output voltage to the desired voltage-protection point; monitor the power supply output voltage to assure correct voltage. If the power supply does not have an adequate adjustment range or is not an adjustable model omit steps 4 and 5, and continue with step 6 below.

4. Slowly turn the voltage adjust control of the Overvoltage Protector counterclockwise until the power supply output voltage, as indicated by the monitoring device, suddenly drops.

5. The voltage-protection point is now set. Remove power supply input power, so that overvoltage protector will reset. Reduce power supply output voltage setting before re-applying input power.

6. If the power supply output voltage adjustment range does not extend to the protection-point voltage computed in step 2, or the power supply being used is not an adjustable model, proceed as follows:

a) Turn on power supply and raise output voltage to the normal operating voltage, taking care to monitor the power supply output voltage.

b) Slowly turn the voltage adjust control of the Overvoltage Protector counterclockwise until the power supply voltage, as indicated by the monitor, drops suddenly.

c) Refer to table below, select appropriate volts/turn ration, and turn voltage adjust control on Overvoltage Protector clockwise by by the numer of turns equivalent to 1 volt plus 15% of the operating voltage.

MODEL	VOLTS/TURN	MODEL	VOLTS/TURN
LMOV-1, -7	0.3	LHOV-4	2.3
LMOV-2, -8	0.8	LHOV-5	4.6
LMOV-3, -9	2.7	LHOV-6	6.9

For Example:

When using a power supply with an output voltage setting of 5 volts together with Overvoltage Protector LMOV-1, calculate as follows:

$$T = \frac{1 + .15\,(OV)}{V/T}$$

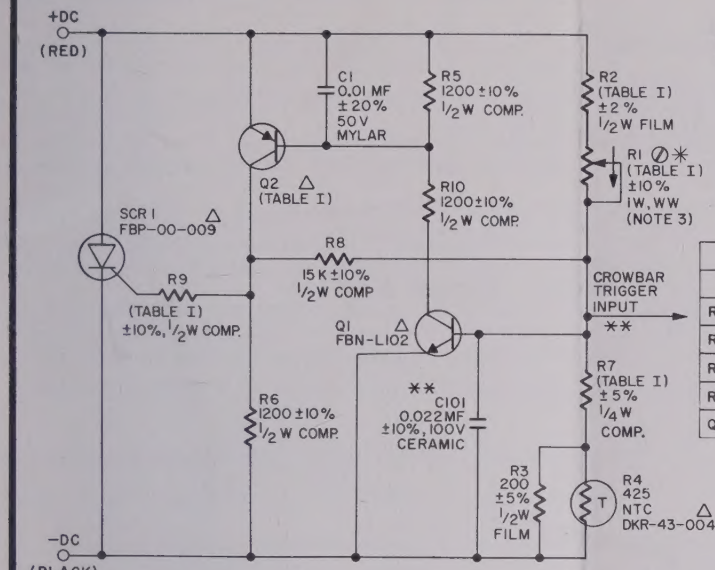
where

T = turns of voltage adjustment control on protector
OV = operating voltage of power supply
V/T = volts/turn ration from table

$$T = \frac{1 + .15\,(5)}{0.3} = 5.8$$

Rotate voltage adjustment control 5.8 turns in clockwise direction to obtain a voltage setting 1.8 volts above the 5-volt power supply setting, or 6.8 volts.

d) With voltage adjustment complete, momentarily remove input power to the supply so that the Overvoltage Protector will reset.



NOTES

1. RESISTOR VALUES ARE IN OHMS.
2. SYMBOLS:
   - ↓ INDICATES CLOCKWISE ROTATION OF SHAFT.
   - ⊘ INDICATES ADJUSTMENT OR CALIBRATION CONTROL.
   - ✳ SEE INSTRUCTION MANUAL.
   - △ LAMBDA PART NUMBER.
3. RI IS 10K ON LHOV-4, 20K ON LHOV-5, AND 30K ON LHOV-6.

TABLE I				
	LMOV-1	LMOV-2	LMOV-3	LHOV
RI	2K	5K	20K	NOTE 3
R2	560	1470	4700	560
R7	33	33	39	33
R9	JUMPER	JUMPER	22	22
Q2	FBN-L103	FBN-L103	FBN-L114	FBN-L114

SCHEMATIC DIAGRAM

OVERVOLTAGE PROTECTORS

LMOV-1, LMOV-2 & LMOV-3

LHOV-4, LHOV-5 & LHOV-6

**ONLY USED ON UNITS WITH "S" OPTION

*R2 ON LMOV-1 WAS 750 OHMS, R2 ON LMOV-2 WAS 1300 OHMS

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIX A

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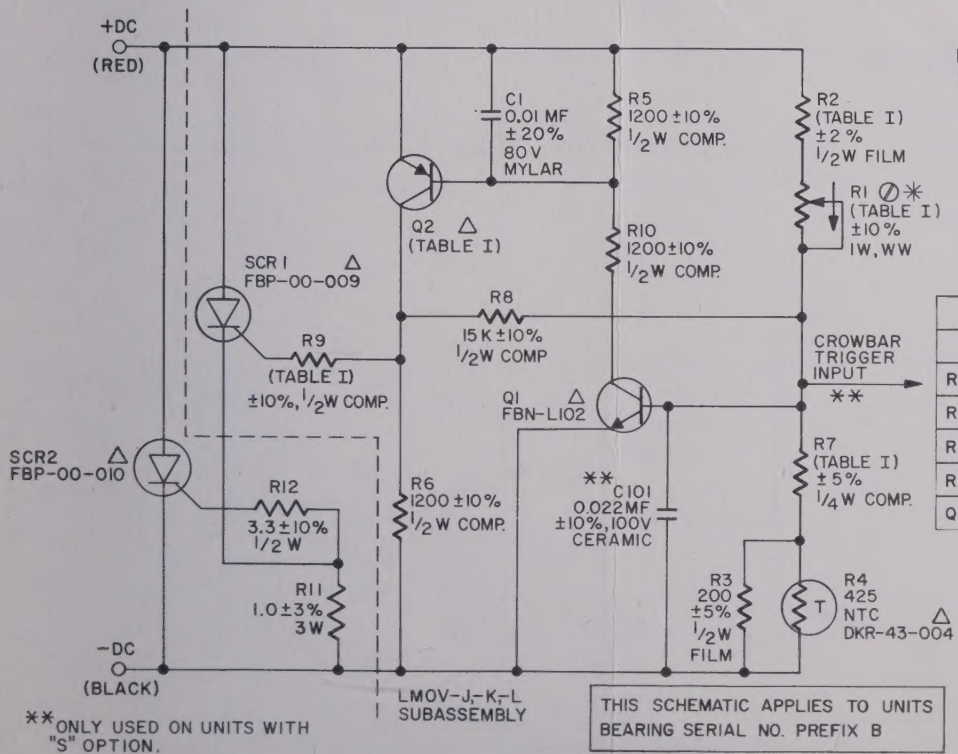

NOTES

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   - ✳ SEE INSTRUCTION MANUAL.
   - △ LAMBDA PART NUMBER.

TABLE I			
	LMOV-7	LMOV-8	LMOV-9
RI	2K	5K	20K
R2	560	1470	4700
R7	33	33	39
R9	JUMPER	JUMPER	22
Q2	FBN-L103	FBN-L103	FBN-L114

SCHEMATIC DIAGRAM

OVERVOLTAGE PROTECTORS

LMOV-7, LMOV-8, & LMOV-9

**ONLY USED ON UNITS WITH "S" OPTION.

THIS SCHEMATIC APPLIES TO UNITS BEARING SERIAL NO. PREFIX B

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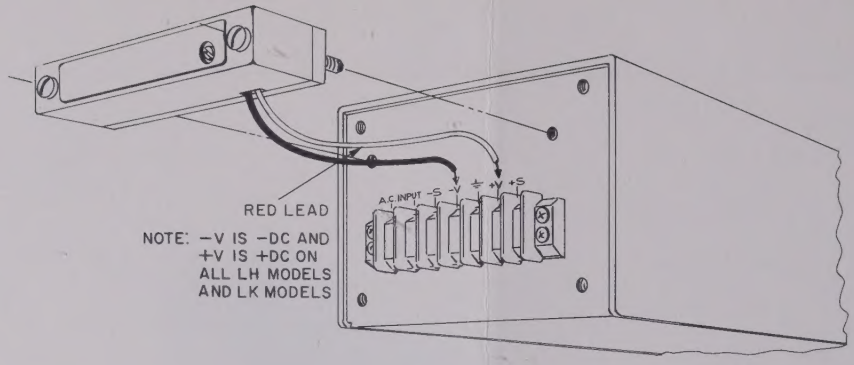


Figure 1. Overvoltage Protector, Typical Horizontal Mounting

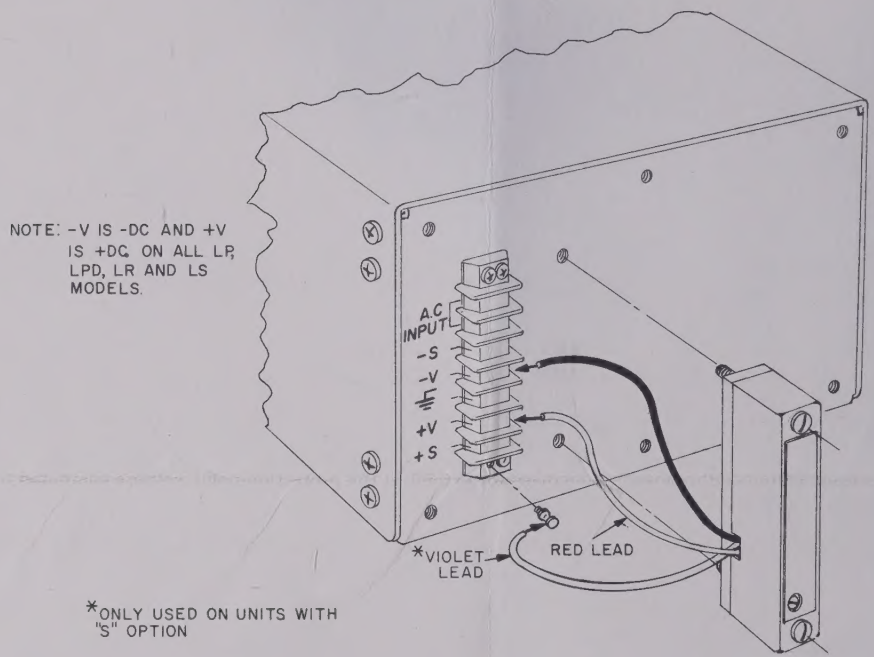


Figure 2. Overvoltage Protector, Typical Vertical Mounting

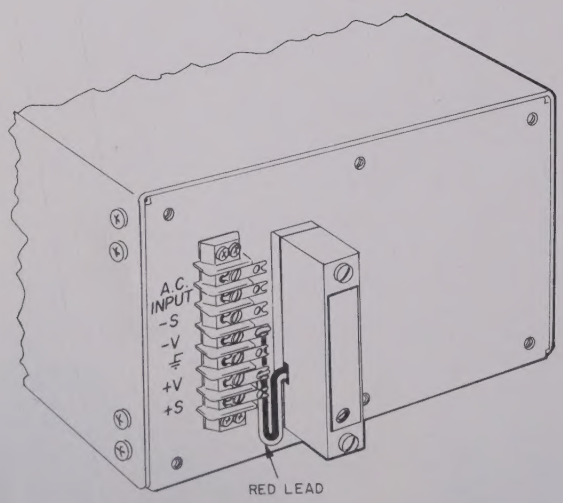


Figure 3. Overvoltage Protector, Typical Installation

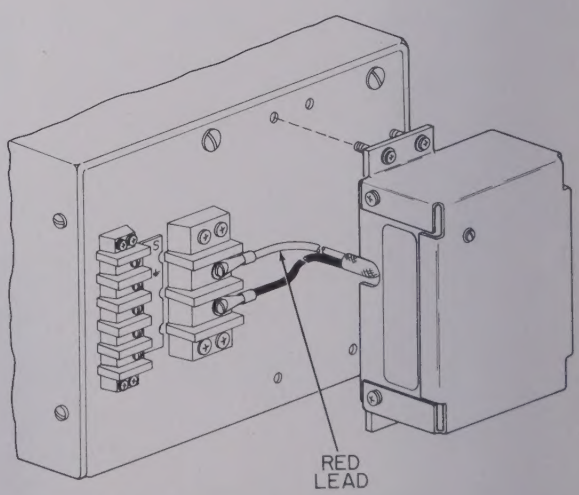
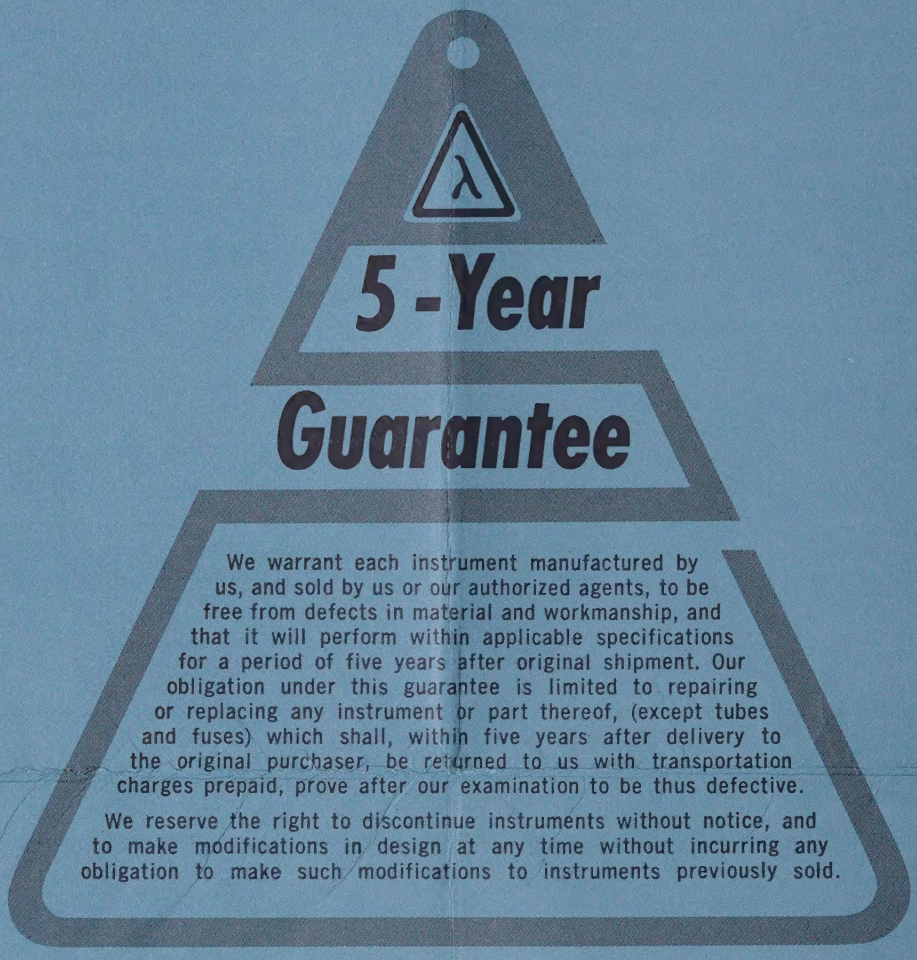


Figure 4. Overvoltage Protector LMOV-7, 8, 9; Typical Installation.


5 - Year
Guarantee
We warrant each instrument manufactured by us, and sold by us or our authorized agents, to be free from defects in material and workmanship, and that it will perform within applicable specifications for a period of five years after original shipment. Our obligation under this guarantee is limited to repairing or replacing any instrument or part thereof, (except tubes and fuses) which shall, within five years after delivery to the original purchaser, be returned to us with transportation charges prepaid, prove after our examination to be thus defective.
We reserve the right to discontinue instruments without notice, and to make modifications in design at any time without incurring any obligation to make such modifications to instruments previously sold.

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